eg. You bungee jump from 111 m using a bungee cord that is 10.0m long. If you have a mass of 85.0kg and height 2.0m(centre of mass is 1.0m)

a) what is your initial gravitational energy relative to the bottom point?
Eg = mgh = 85kgx9.8N/kgx111m= 92,463.0
9.25×10^4J

b) what is your speed when the cord is about to start stretching?
$mgh = 1/2\ mv^2$

$v = \sqrt{2gh} = \sqrt{2 \times \frac{9.80N}{kg} \times 10.0m} =$

$19.6m/s$

c) what elastic constant of the bungee cord will just stop you from hitting the water?
$mgh = 1/2\ kx^2$
$k = 2mgh/x^2$ =2(85.0kg)(9.80N/kg)111m

$/(111m-10m)^2$
$= 2x85x9.8x111/110^{\wedge}2=15.2831$
15.3 N/m (yes, a bit unreasonable to stretch 110m)

d) what is your acceleration at the bottom point?
$a = F_{net}/m=(F_{elastic}-mg)/m=(kx-mg)/m$
$a=(15.283N/m \times 110.0m - 85.0kg \times 9.8N/kg)/85.0kg$
$= 9.98\ m/s^2$ upwards

e) what is the stretch of the bungee cord at equilibrium point(where you stop bouncing)?
$Fg=F_{elastic}$
$mg = kx$
$x = 85.0kgx9.80N/kg/15.283N/m$
54.5m

f) how much energy was lost in frictional forces when you are at rest
at equilibrium point?

$E_{lost} = E_{gi} - E_{elasticf} = mgh - 1/2kx^2$
$= 85.0kg(9.80N/kg)(54.5m+10m) - 1/2\ 15.283N/m\ (54.5m)^2$
$= 31\ 027J = 3.10 \times 10^4 J$ lost as heat to air and cord